A130-1.9F

American Council for Capital Formation
Center for Policy Research

June 1990

SPECIAL REPORT

The Impact of Environmental Regulation and Energy Prices on U.S. Economic Growth

At a June 11 symposium on "Environmental Policy and the Cost of Capital" sponsored by the American Council for Capital Formation Center for Policy Research, Harvard Professor Dale W. Jorgenson described the impact that environmental legislation has had on U.S. economic growth. He also presented the results of his new study, "Global Change, Energy Prices, and U.S. Economic Growth,"[1] which considers the potential macroeconomic effects of measures to reduce greenhouse gases in the atmosphere—considered a factor in global warming. This Special Report *offers highlights of Dr. Jorgenson's study.*

Environmental Regulations, Growth, and Capital Costs

The most striking economic development in the United States during the postwar period has been the sharp decline in the rate of economic growth during the 1970s and 1980s. Real output grew at an average annual rate of 3.7 percent during the period 1947–1973. By contrast, the growth rate from 1973 to 1985 was only 2.5 percent, fully 1.2 percentage points lower. Two events coincided with the slowdown: the advent of environmental regulation and the increase of world petroleum prices.

An earlier study, "Environmental Regulation and U.S. Economic Growth" by Jorgenson and Wilcoxen (J&W), focused on the relationship between pollution abatement costs and economic growth.[2] Pollution control legislation began in earnest in the United States in 1965, when amendments to the Clean Air Act set national automobile emissions standards for the first time. The extent of regulation increased dramatically in 1970 with the passage of the National Environmental Policy Act and amendments to the Clean Air Act. In 1972 the Clean Water Act was passed, and revisions to this act and to the Clean Air Act were adopted in 1977. The consequence of this legislation was a large and abrupt shift of economic resources toward pollution abatement, J&W observe.

According to the authors, spending on pollution abatement was insignificant in 1967 but increased substantially from 1968 to 1978; much of this additional spending was required to bring existing facilities into compliance with the new regulations. Since 1978 the growth of pollution abatement costs has leveled off, while the proportion of investment devoted to pollution control devices has declined substantially.

J&W analyze the impact of environmental regulation by simulating the growth of the U.S. economy both with and without regulation. GNP growth was slowed by environmental regulation over the 1973–1985 period, according to the study. Among the environmental regulatory measures, mandated investment in pollution control equipment had the largest impact, with motor vehicle emissions control not far behind. The added operating costs due to pollution abatement played a minor role in the growth slowdown. The three types of environmental regulation together were responsible for a drop in annual GNP growth of 0.191 percentage points.

The cost of environmental regulation in the long run (after 1995) is a permanent, annual reduction of 2.59 percent in U.S. gross national product. This is more than 10 percent of the share of total government purchases of goods and services in the national product during the period 1973–1985. In addition, the cost of capital (defined as the pretax return required by an investor) is almost 5 percent higher in the long run than it would have been in the absence of environmental regulation, and the capital stock is almost 4 percent lower.

---

[1]Dale W. Jorgenson and Peter J. Wilcoxen, "Global Change, Energy Prices, and U.S. Economic Growth," prepared for the American Council for Capital Formation Center for Policy Research symposium on Environmental Policy and the Cost of Capital, Washington, D.C., June 1990.

[2]Dale W. Jorgenson and Peter J. Wilcoxen, "Environmental Regulation and U.S. Economic Growth," *Harvard Institute of Economic Research Discussion Paper Series* (Cambridge, Mass.: Harvard University, July 1989).

Energy Price Increases, Growth, and Capital Costs

J&W's latest study examines another factor that contributed to the U.S. growth slowdown: higher oil prices in the 1970s and 1980s. The results of this new research enable the authors to estimate the probable economic impact of a tax on carbon dioxide emissions (a tax on oil, gas, and coal). The authors note that global warming associated with the greenhouse effect has emerged as a leading environmental concern and that many nations, including the United States, are considering policy measures designed to reduce the rate of greenhouse gas emissions. Senator Tim Wirth and Representative Pete Stark both have recently introduced carbon tax legislation. In addition, environmental groups such as the Natural Resources Defense Council have called for strong, immediate action to reduce the emission of greenhouse gases.

The greenhouse effects come about because trace gases in the atmosphere, often called greenhouse gases, are transparent to visible light but reflect infrared. Sunlight passes through these gases unimpeded and is absorbed by terrestrial objects. Later, much of this energy is emitted as infrared radiation. Since greenhouse gases reflect infrared, they tend to trap energy in the atmosphere, which results in heating. The concentration of greenhouse gases in the atmosphere determines how much energy is trapped and thus how much heating occurs.

Carbon dioxide (CO_2) is the most important contributor to the greenhouse effect, but other gases are also important. Much of the carbon dioxide in the atmosphere originates as a natural consequence of respiration, but combustion, particularly of fossil fuels, has increased the atmospheric concentration by 25 percent since the industrial revolution. Human activity has also increased the concentration of most of the other greenhouse gases, especially chlorofluorocarbons, which are widely used in refrigeration and in the production of certain kinds of foam. At present rates of emission, carbon dioxide accounts for about one-half of the increases in the concentration of greenhouse gases, while other gases account for the remainder.

That greenhouse gases trap energy and lead to heating of the atmosphere is not controversial; a great deal of uncertainty exists, however, about *how much* heating will be produced by a given increase in greenhouse gases and *when* the heating will occur. Current research indicates that the concentration of greenhouse gases is likely to double in the next century, with mean surface temperatures rising by 1.5 to 5.5 degrees centigrade. Historical data indicates that global temperatures have risen by 0.5 degrees centigrade during the past 100 years and that the rate of increase has been accelerating.

The environmental consequences of global warming could be quite severe. Global warming might, for example, change patterns of precipitation, cause land to be inundated by increases in the sea level, and increase the frequency of violent storms such as hurricanes. As a consequence, a sizable constituency is urging policy measures to reduce greenhouse gas emissions. For example, the Toronto Conference on the Changing Atmosphere, held in June 1988 and attended by representatives from forty-eight nations, recommended that world carbon dioxide emissions be reduced by 20 percent of the 1988 level by the year 2005 and eventually be reduced by 50 percent.

Policy Options for Reducing Carbon Dioxide

Several policies have been suggested for reducing emissions of greenhouse gases:

- *A tax on fossil fuels based on their carbon content.* Such a tax could be used to reduce emissions of carbon dioxide. This would lead to substitution of other inputs for fossil fuels and an increase in the relative utilization of fuels such as natural gas that have a lower carbon content. The sources of carbon dioxide are electric utilities (33 percent), transportation (31 percent), industry (24 percent), and residential (12 percent). A carbon tax would shift energy utilization in these sectors toward other energy sources, such as solar, nuclear, and hydroelectric power.
- *Phasing out the use of chlorofluorocarbons* (CFCs). Although they form only a tiny fraction of greenhouse gases, CFCs are very effective at trapping infrared radiation.
- *Reforestation.* This policy option is recommended by the Environmental Protection Agency. Since growing forests absorb carbon, an aggressive program of planting trees and other vegetation could partially compensate for an increase in carbon dioxide emissions.

The Model

A carbon tax employs higher energy prices, especially higher prices of fossil fuels, to reduce carbon dioxide emissions. Measuring the economic impact of future taxes on carbon dioxide emissions is an easier task today, according to J&W, because of the experience gained during oil price increases of the 1970s and 1980s. The past two decades of U.S. experience with oil price increases have provided a natural experiment that is useful in assessing the economic impact of a carbon tax for reducing emissions. Between 1973 and 1975 the price of imported petroleum increased by a factor of three

as a consequence of supply disruptions associated with the Arab oil embargo. Between 1978 and 1980 oil prices doubled as a result of disruptions in supply that followed the Iranian revolution.

The past two decades of U.S. experience with oil price increases have provided a natural experiment that is useful in assessing the economic impact of a carbon tax for reducing emissions.

The dramatic increases in real world petroleum prices during the 1970s were followed by a gradual decline in prices between 1980 and 1985 that gave way to a precipitous drop in 1986. By 1987 real petroleum prices had stabilized at levels that were more than double those prevailing in 1972. The increase in world petroleum prices raised the real cost of energy in the United States for all forms of energy. This increase in energy prices resulted in substantial energy conservation and stabilized carbon dioxide emissions between 1972 and 1987. Emissions of carbon dioxide released 1.224 billion tons of carbon into the atmosphere in 1972; fifteen years later in 1987 the emissions were identical.

In order the analyze the natural experiment of energy price changes on economic growth that resulted from higher world petroleum prices since 1973, J&W simulated the growth of the U.S. economy with and without these price increases, using a general equilibrium macroeconomic model disaggregated to thirty-five industrial sectors. Their model differs from previous ones in two respects. First, it incorporates an econometric analysis of an extensive new data base, developed specifically for the purpose of modeling the economic impact of environmental regulation. Second, it is highly disaggregated in its representations of producer and consumer behavior, which is essential in capturing the differential impact of policies to reduce greenhouse gas emissions by firms and households.

Impact of Higher Oil Prices

J&W's study shows that the higher oil prices that resulted from the supply disruptions in 1973–1975 and 1978–1980 have significant long-run (post-1995) effects on U.S. annual growth rates and costs:

- Real GNP growth is 1.3 percent lower.
- The price of investment goods is 1.1 percent higher.
- The capital stock is 0.9 percent lower.
- The cost of capital is 0.9 percent higher.
- The exchange rate (the price of U.S. imports relative to the price of U.S. exports) is 1.3 percent higher.

J&W conclude that the 1972–1987 world oil price increase had a substantial long-run impact on the level of the U.S. real GNP. However, this *increase in petroleum price levels* explains only a relatively modest portion of the slowdown in U.S. economic growth over the period 1974–1985. A much larger part of the slowdown in economic growth can be attributed to the *petroleum price shocks* of the 1970s. Isolating these price shocks from the change in world petroleum price levels, J&W find that almost *two-thirds* of the slowdown in U.S. economic growth between 1974 and 1985 can be attributed to the sharp run-up in oil prices that ended in 1981.

J&W's analysis also shows that energy price increases have had powerful effects on certain industries. For example, higher oil prices resulted in a drastic fall in the output of the petroleum refining sector, and the output of electric utilities is also substantially lower, compared to baseline levels. The output of chemicals manufacturing and gas utilities is also reduced by higher oil prices, while foods and tobacco experience a modest increase in output as a consequence of substitution away from energy-intensive commodities by businesses and households.

Conclusions

J&W's study shows that most of the slowdown in economic growth over the 1974–1975 period can be traced to the petroleum price *shocks* of the 1970s rather than the *increase* in petroleum price levels between 1972 and 1987. Abrupt changes in energy prices can be very costly in terms of foregone growth and higher capital costs for the U.S. economy. Although the changes that J&W analyzed are due to disruptions in the world oil markets in the 1970s and 1980s, sharp increases in prices could also result from the imposition of taxes on fossil fuels intended to stabilize emissions of carbon dioxide. Thus the Jorgenson-Wilcoxen analysis suggests that a tax on carbon dioxide emissions that resulted in sharp energy price increases would have negative effects on U.S. growth and capital costs.

The ACCF Center for Policy Research is the education and research affiliate of the American Council for Capital Formation. Its mandate is to promote an understanding by the public of the importance of capital formation to the economy. For more information or to receive additional copies of this *Special Report*, please contact: ACCF Center for Policy Research, 1850 K Street, N.W., Suite 400, Washington, D.C. 20006, (202) 293-5811.

TA1310-1-10F

American Council for Capital Formation
Center for Policy Research

August 1990

SPECIAL REPORT

International Survey of the Taxation of Personal Saving and Saving Rates

A review of saving incentives offered in twelve industrialized countries recently completed by the American Council for Capital Formation Center for Policy Research revealed that the United States offers fewer and less generous saving incentives than most other industrialized countries. The survey is part of a series of studies by the Center on saving issues.

The international survey indicates that the United States ranks near the bottom of a list of twelve countries in terms of personal saving incentives. For example, the U.S. capital gains tax rate on long-term gains on portfolio securities exceeds that of all other countries except Australia and the United Kingdom, and even they index the cost basis of an asset. Interest income is taxed at rates below the U.S. maximum rate of 33 percent by five of the twelve countries. Total taxes (individual plus corporate) on dividends received by individuals are lower in most countries than in the United States because most other countries have some form of dividend tax relief. For example, Japan's total individual and corporate tax rate is 45 percent on dividends and West Germany's is 26.7 percent, compared to the U.S. rate of 56 percent.

Individual Retirement Account deductions are more generous in six of the twelve countries than they are in the United States. Nearly half of the twelve countries permit deductions or tax credits for life insurance premiums; the United States does not. Individual social security contributions to government-sponsored plans are deductible in eight of the twelve countries but not in the United States.

Given the relatively weak U.S. saving incentives, it is perhaps no coincidence that the U.S. personal saving rate, which averaged 6.7 percent over the 1972–1989 period, remains far below that of our major competitors. Japan, for example, had a personal saving rate for this period of 18.4 percent, West Germany's rate was 12.8 percent, and Canada's was 12.4 percent.

An *International Survey of the Taxation of Personal Saving and Saving Rates* was prepared by David Tumblin, research associate with the ACCF Center for Policy Research. A major compendium of research on saving issues, *The U.S. Savings Challenge: Policy Options for Productivity and Growth* edited by Charls E. Walker, Mark A. Bloomfield, and Margo Thorning, will be available in October 1990.

Country	Personal Saving[1] 1972–1989	Capital Gains Maximum Tax Rate[2] Short-Term	Capital Gains Maximum Tax Rate[2] Long-Term	Interest Income Maximum Tax Rate[3]	Dividend Income Corp./Ind. Integration[4]	Dividend Income Combined Corp./Ind. Max. Tax Rate[5]
United States	6.7%	33%	33%	33%	No	56%
Japan	18.4%	1% of sales price or 20% of net gain.	1% of sales price or 20% of net gain.	20%	Yes	45%
Australia	10.4%	47%	47% ; asset cost is indexed.	47%	Yes	13.1%
Belgium	15.1%	Exempt	Exempt	10%	No	55.8%
Canada	12.4%	21.8%	21.8%	29%	Yes	19.6%
France	16.7%	16%	16%	56.8%	Yes	35.2%
Germany (West)	12.8%	53%	Exempt	53%	Yes	26.7%
Hong Kong	N.A.	Exempt	Exempt	Exempt	Exempt	Exempt
Italy	21.7%	Exempt	Exempt	30%	Yes	21.9%
Netherlands	3.3%	Exempt	Exempt	60%	No	74%
Sweden	1.8%	35%	17.5%	35%	No	40.5%
United Kingdom	9.8%	40% ; asset cost is indexed.	40% ; asset cost is indexed.	40%	Yes	20%

Country	Individual Retirement Plans[6]	Life Insurance Premiums[5]	Social Security Contributions
United States	Contributions to $2,250 are fully deductible for joint returns with income to $50,000; $2,000 for single filers with income to $35,000.	Not deductible.	Not deductible.
Japan	No provisions.	Both term and whole life premiums are deductible.	Fully deductible.
Australia	Contributions are taxed at a rate of 15% , compared to a top 47% rate for ordinary income.[7]	Not deductible.	No provisions.
Belgium	Contributions are deductible to a limit.	Both term and whole life premiums are deductible.	Fully deductible.
Canada	Contributions to employer-sponsored plans are deductible to $3,025.	Not deductible.	Individual contributions receive a 17% tax credit.
France	Contributions may accumulate tax free to $108,402.	A 25% tax credit is allowed on term premiums.	Fully deductible.
Germany (West)	No provisions.	Both term and whole life premiums are deductible.	Individual contributions are deductible to a limit.
Hong Kong	No provisions.	Not deductible.	No provisions.
Italy	No provisions.	Both term and whole life premiums are deductible.	Individual contributions are deductible to a limit.
Netherlands	Contributions to $9,087 are deductible.	Not deductible.	Individual contributions are deductible to a limit.
Sweden	Contributions to $4,978 are deductible.	Not deductible.	Contributions are by employers only.
United Kingdom	Contributions to 15% of total compensation are fully deductible.	Not deductible.	Not deductible.

Note: All information is current through April 1990. The tax rates given refer only to federal taxes.

[1] Net household saving as a percent of disposable household income. Organisation for Economic Co-Operation and Development, *OECD Economic Outlook* 47, June 1990, Table R 12, p. 192.

[2] Reflects top marginal tax rates on portfolio securities gains.

[3] Reflects top marginal tax rates on interest received.

[4] Corporate individual tax integration refers to methods used to relieve the double taxation of corporate earnings distributed to shareholders. These methods vary among countries.

[5] The total maximum federal tax rate on corporate earnings distributed to the individual. The maximum U.S. rate is 56% (34% per dollar at the corporate level, plus 33% of the remainder [$.0.66] when received by the individual).

[6] Currency conversions based on exchange rates on July 18, 1990.

[7] Taxpayers with income below $24,158 can opt to receive annual tax rebates up to $584 for individual retirement plan contributions instead of having the contribution taxed at a 15% rate.

[8] Term life and whole life insurance premiums are differentiated because of their saving characteristics. Term policies are generally short term and build only small cash values, whole life insurance provides increasing cash values and pays face value to a beneficiary on the death of the insured.

The ACCF Center for Policy Research is the education and research affiliate of the American Council for Capital Formation. Its mandate is to promote an understanding by the public of the importance of capital formation to the economy. For more information or to receive additional copies of this *Special Report*, please contact: ACCF Center for Policy Research, 1850 K Street, N.W., Suite 400, Washington, D.C. 20006, (202) 293-5811.